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Host Preferences of Gypsy Moth on a New Frontier of Infestation

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Abstract

Knowing what gypsy moth likes to eat can aid forest managers in making cost-effective control decisions. A recent 5-year study of defoliation in central Pennsylvania gives an up-to-date index of host species preferences. Chestnut oak is the most preferred species. Following in relatively close order are the other oaks and aspen. Hardwood species that rank low on the preference list are yellow-poplar, yellow birch, black locust, striped maple, ash, and black gum.

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trees 3.0 inches d.b.h. and larger were made each year from 1979 to 1983, in June or July, at peak periods of defoliation. The percentage of foliage eaten on each of nearly 15,000 trees was estimated to the nearest 10 percent. Individual tree defoliation (DF_i) weighted by the square of that tree's diameter (D_i^2) was used to calculate average defoliation (DF) for each plot:

$$\overline{DF} = \frac{\sum_{i=1}^n D_i^2 DF_i}{\sum_{i=1}^n D_i^2}$$

Knowing what gypsy moth likes to eat can be a big help to forest managers trying to cope with the pest. At very least, it sharpens their intuition for making cost-effective decisions about control. A recent 5-year study of defoliation in central Pennsylvania gives an up-to-date look at host species preferences. The study was a cooperative venture with USDA Forest Service's Northeastern Area, State and Private

Forestry, and the Pennsylvania Bureau of Forestry.

Tree defoliation was measured on 575 plots (0.1-acre) located between State College and Carlisle, Pennsylvania. This area was on the leading edge of gypsy moth infestations in the late 1970's and early 1980's. The plots were established in 1978 in advance of infestations. Visual estimates of defoliation for

Weighting by D^2 compensates for differences in tree crown size.

The greatest and, in fact, the only significant amount of gypsy moth defoliation (plotwide) occurred in 1981 (Fig. 1). Nearly half the plots

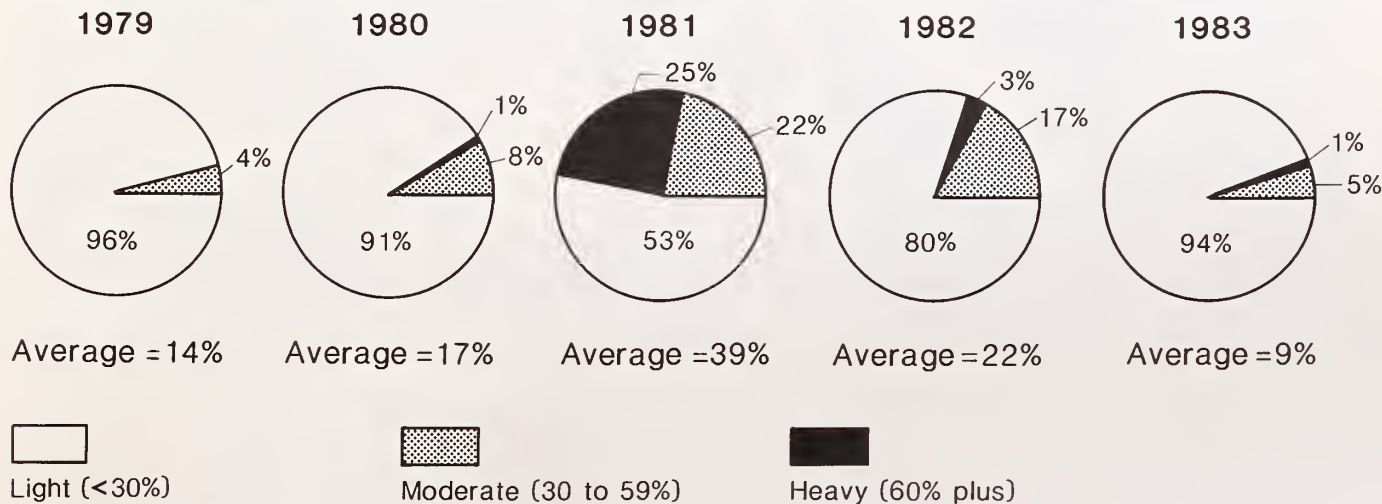


Figure 1.—Defoliation on central Pennsylvania plots, 1979-83.

received moderate (30 to 59 percent) or heavy (60+ percent) defoliation that year. Plot defoliation averaged 39 percent in 1981, almost twice that of any other year of the study.

Tree defoliation measured in 1981 was averaged for individual species. These averages provide empirical indexes for gauging the

relative susceptibility of each species (Fig. 2). Species with small numbers of sample trees and large variances of mean defoliation were pooled as "other."

It is not surprising that chestnut oak ranks number one on the list of preferred species. Its 60 percent average defoliation is signif-

icant. Many consider 60 percent defoliation a critical threshold. It is the level above which trees will re-foliate and use up vital nutrient reserves. Ranking close to chestnut oak is black oak. Following in relatively close order are the other oaks and aspen.

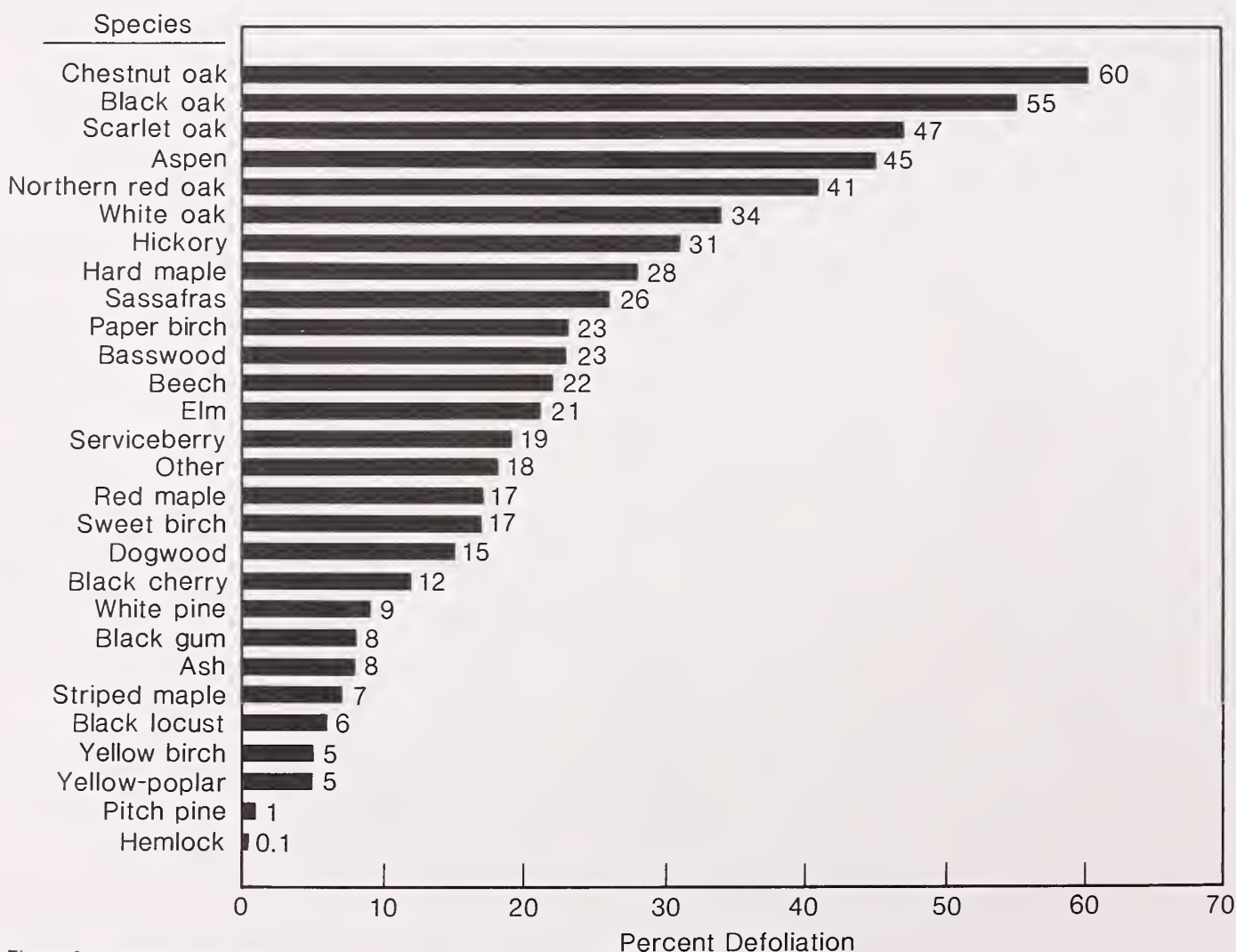


Figure 2.—Average defoliation by species, 1981 (central Pennsylvania).

At the other end of the scale are hemlock and pitch pine. In some past outbreaks, gypsy moth larvae have fed on these two softwood species. But during our study they were virtually unscathed. Hardwood species that rank low on the preference list are yellow-poplar, yellow birch, black locust, striped maple, ash, and black gum (Fig. 3). Defoliation for each of these hardwoods averaged less than 10 percent in 1981.

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Figure 3.—An untouched yellow-poplar thrives amid oaks that were stripped and died.

